4 Equivalent fractions

We are learning to convert a fraction into any equivalent fraction.

NUMBER KNOWLEDGE

Numeracy Book 4
- The Same But Different
- Number Fans
- Who Gets More?
- Who Has More Cake?

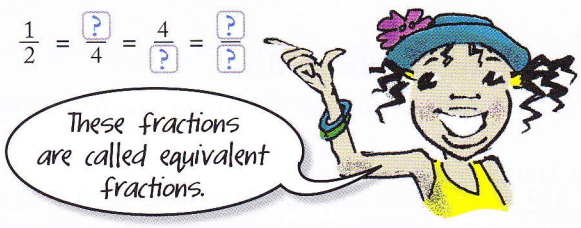
In *AMI* and *this book*
- Multiples..... page 170 *(AMI)*
- Ordering fractions..... page 187
- Equivalent fractions..... page 186

Paper, ruler, coloured pens.

Activity

1 a Use the fraction wall to fill in the missing numbers.

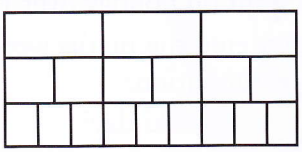
$\frac{1}{2} = \frac{?}{4} = \frac{4}{?} = \frac{?}{?}$



b Sam drew this fraction wall to help him fill in the gaps in this equation.

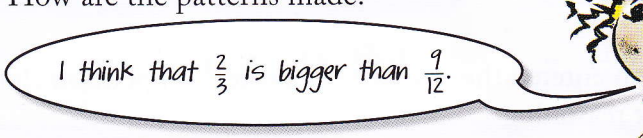
$\frac{1}{3} = \frac{?}{6} = \frac{?}{9}$

Explain why he drew it like this and how you can use it to fill in the gaps.



c What patterns do you notice in the numerators and denominators of each of the fraction equations in **parts a and b**? How are the patterns made?

d

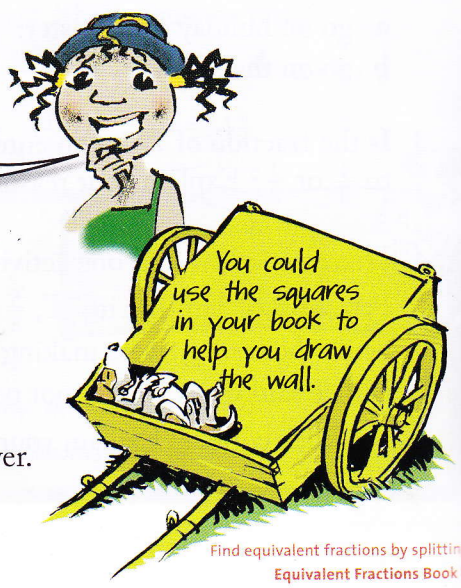


Is Millee correct? Explain why or why not.

e Draw a fraction wall to help find the missing numbers in this equation.

$\frac{1}{4} = \frac{?}{8} = \frac{3}{?} = \frac{?}{16}$

f Which is bigger $\frac{3}{4}$ or $\frac{11}{16}$? Justify your answer.



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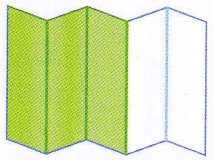
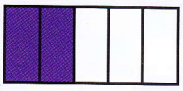
2 Fold a piece of paper into fifths. Colour three of the fifths. Fold the paper the other way into thirds. Open it out.



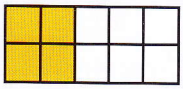
a How many smaller rectangles are there altogether?

b What fraction of them is coloured?

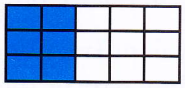
3 Four students had cakes that were identical except for the colours of the icing. Each cake was cut into a different number of pieces.



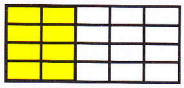
Cake 1



Cake 2



Cake 3



Cake 4

a Copy and finish these for the fraction of each cake that has coloured icing.

Cake 1	Cake 2	Cake 3	Cake 4
$\frac{2}{5}$	$\frac{?}{10}$	$\frac{?}{15}$	$\frac{?}{20}$

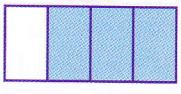
b Is the same proportion of each cake iced?

c What is the relationship between each of the fractions iced? Write an equation.

d What do you notice about the numerators and the denominators of the four fractions?

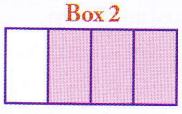
e Copy the boxes below into your book. Draw horizontal lines on **boxes 2, 3 and 4** to show the fraction given under each.

Box 1



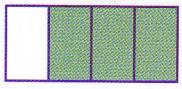
$\frac{3}{4}$

Box 2



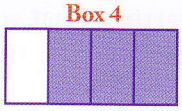
$\frac{6}{8}$

Box 3



$\frac{9}{12}$

Box 4



$\frac{12}{16}$

f What can you say about the four fractions? Write an equation for them.

g Discuss and write down a rule for making equivalent fractions.

4 a Copy the equations and fill in the missing numbers.

i $\frac{3}{4} = \frac{?}{8}$ ii $\frac{9}{12} = \frac{?}{4}$ iii $\frac{5}{8} = \frac{20}{?}$ iv $\frac{30}{45} = \frac{?}{3}$

b Explain to a classmate how you found the missing numbers.

c Find some fractions that are equivalent to $\frac{5}{8}$.

d Find some fractions that are equivalent to $\frac{20}{24}$.

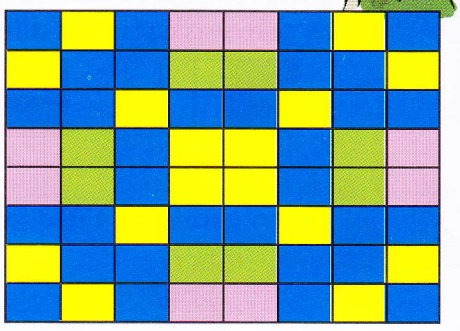
5 a Work out what goes in the boxes and continue the pattern to find all the missing numbers.

i $\frac{5}{8} = \frac{10}{16} = \frac{?}{24} = \frac{20}{?} = \frac{?}{40} = \frac{?}{48} = \frac{?}{?}$ ii $\frac{36}{45} = \frac{?}{40} = \frac{28}{?} = \frac{?}{30} = \frac{20}{?} = \frac{?}{20} = \frac{?}{?} = \frac{?}{?} = \frac{?}{5}$

b Millee said that the numbers in the numerators of all of the fractions in **part a ii** are divisible by the same number. Is Millee correct? Explain your answer.

c Could Millee make the same statement about the numbers in the denominators? Explain.

6 Tamara made this patchwork quilt.



a Write two equivalent fractions that describe the yellow part of the quilt.

b Tamara needed a total of four metres of material to make the quilt.
How much yellow did she need?

c How much green material did she need?

7 Challenge

How many equivalent fractions is it possible to find that are equal to any given fraction? Explain your answer.

8 Find the missing numbers in these. Once you have found them, discuss with a partner what you needed to know to solve them.

a $\frac{3}{4} = \frac{?}{8}$ (× ? / × ?) **b** $\frac{1}{5} = \frac{?}{20}$ **c** $\frac{3}{5} = \frac{15}{?}$ **d** $\frac{5}{6} = \frac{?}{30}$ **e** $\frac{5}{9} = \frac{?}{108}$ **f** $\frac{4}{5} = \frac{96}{?}$

9 Find the missing numbers in these. Once you have found them, discuss with a partner what you needed to know to be able to solve them.

a $\frac{10}{12} = \frac{?}{6}$ (÷ ? / ÷ ?) **b** $\frac{9}{15} = \frac{?}{5}$ **c** $\frac{30}{45} = \frac{6}{?}$ **d** $\frac{40}{48} = \frac{?}{6}$ **e** $\frac{60}{84} = \frac{?}{7}$ **f** $\frac{44}{110} = \frac{?}{10}$

10 Show, using diagrams, that $\frac{3}{4}$ is **not** equivalent to $\frac{16}{20}$.

11 Challenge

Which fraction is bigger, $\frac{3}{7}$ or $\frac{4}{9}$?
How can you tell without using a diagram?

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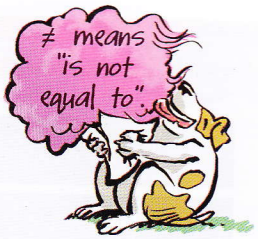
12 Write three fractions that are equivalent to each of these.

a $\frac{3}{10}$ b $\frac{4}{5}$ c $\frac{36}{45}$ d $\frac{18}{60}$ e $\frac{72}{108}$



13 Which of = or ≠ goes in the box to make these true? Justify your answer.

a $\frac{1}{4}$? $\frac{4}{20}$ b $\frac{4}{5}$? $\frac{20}{25}$ c $\frac{5}{20}$? $\frac{80}{200}$ d $\frac{2}{5}$? $\frac{33}{45}$

e $\frac{270}{360}$? $\frac{3}{4}$ f $\frac{5}{11}$? $\frac{50}{110}$ g $\frac{3000}{9000}$? $\frac{4}{12}$ h $\frac{7}{25}$? $\frac{48}{200}$

14 a Write a fraction with denominator 96 for each of these fractions.

i $\frac{1}{4}$ ii $\frac{3}{8}$ iii $\frac{5}{6}$ iv $\frac{7}{12}$

b Put the fractions in **part a** in order from largest to smallest.

15 Write a fraction with a denominator greater than 99 that is equivalent to

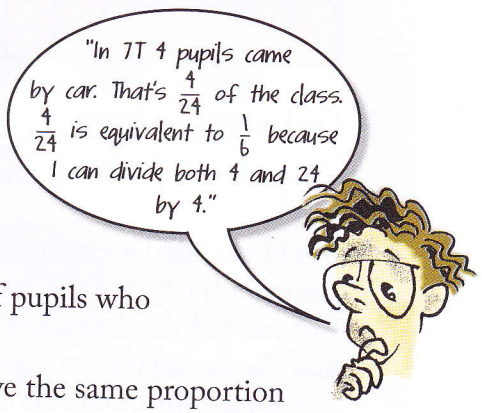
a $\frac{9}{25}$ b $\frac{7}{12}$ c $\frac{19}{30}$ d $\frac{11}{18}$ e $\frac{12}{27}$

16 Jaydon's class did a survey to find how the year 7 pupils came to school. These are the results.

7T (24 pupils)	
Bike	8
Bus	6
Car	4
Walk	2
Train	4

7B (36 pupils)	
Bike	12
Bus	9
Car	6
Walk	3
Train	6

7G (20 pupils)	
Bike	4
Bus	5
Car	2
Walk	6
Train	3



a Which two classes have the same proportion of pupils who

i bike? ii train?

b For which way to school do all three classes have the same proportion of pupils?

17 Challenge

Carry out a survey to find out some information about a group of pupils at your school. For your survey you must:

- Survey either 24, 30 or 36 pupils.
- Write down **ten** questions to ask each student.

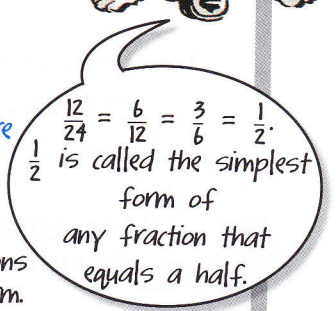
One of Sam's questions was, "How many brothers and sisters do you have?"

Millee asked, "Have you ever travelled on a Cook Strait ferry?"

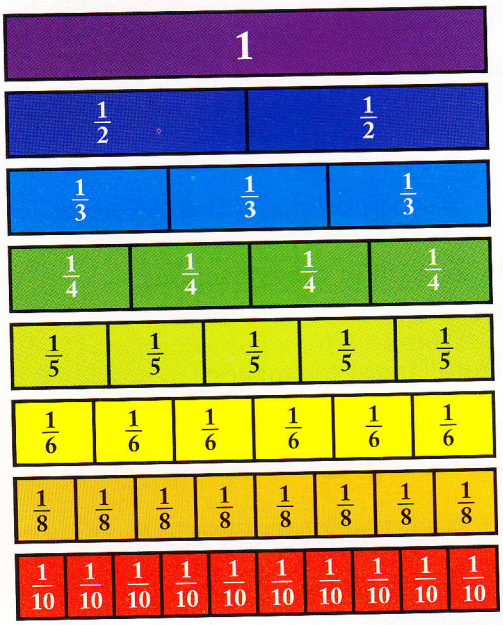
Jayden wanted to know, "Which month were you born in?"

- Create a form to collect your data.

Once you have collected all your data write the answers to your questions as fractions of the total asked. Write each fraction in its simplest form.



Making comparisons



1 a Which is bigger, $\frac{1}{2}$ or $\frac{1}{3}$?

b Which is smaller, $\frac{1}{5}$ or $\frac{1}{4}$?

c Which is bigger, $\frac{2}{3}$ or $\frac{3}{5}$?

d Which is bigger, $\frac{6}{10}$ or $\frac{6}{8}$?

2 Put these in order from smallest to largest.

a $\frac{1}{2}, \frac{1}{6}, \frac{3}{10}, \frac{1}{4}, \frac{4}{5}$

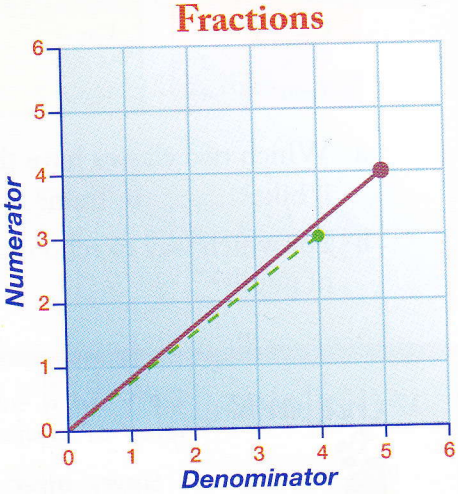
b $\frac{3}{4}, \frac{5}{8}, \frac{3}{5}, \frac{2}{3}, \frac{5}{6}, \frac{7}{10}$

3 Find a fraction between

a $\frac{2}{3}$ and $\frac{3}{4}$ b $\frac{3}{4}$ and $\frac{5}{6}$ c $\frac{5}{6}$ and $\frac{9}{10}$

4 Maddison used a graphing method to compare fractions.
She plotted the denominator on one axis and the numerator on the other.
She joined this point to the origin (0, 0) with a line.

This example shows $\frac{3}{4}$ and $\frac{4}{5}$.



a Discuss how Maddison could tell if $\frac{3}{4}$ or $\frac{4}{5}$ is larger.

b Draw a set of axes with the numbers from 0 to 20.
Plot these fractions on your grid.

$\frac{7}{8}$ $\frac{3}{4}$ $\frac{13}{20}$ $\frac{9}{13}$ $\frac{7}{12}$

Use your graph to put them in order from largest to smallest.

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Puzzling fractions

1 Make a copy of this diagram.
Shade the fractions in each column that are equivalent to the fraction in the circle at the bottom of the column. The shading will make a pattern.

$\frac{2}{5}$	$\frac{5}{10}$	$\frac{2}{5}$	$\frac{2}{2}$	$\frac{81}{100}$	$\frac{1}{10}$	$\frac{3}{10}$
$\frac{50}{100}$	$\frac{5}{20}$	$\frac{70}{100}$	$\frac{50}{50}$	$\frac{3}{4}$	$\frac{3}{10}$	$\frac{6}{18}$
$\frac{14}{28}$	$\frac{36}{60}$	$\frac{27}{36}$	$\frac{45}{45}$	$\frac{4}{5}$	$\frac{12}{48}$	$\frac{8}{20}$
$\frac{32}{48}$	$\frac{7}{10}$	$\frac{4}{6}$	$\frac{11}{11}$	$\frac{5}{20}$	$\frac{5}{25}$	$\frac{10}{25}$
$\frac{22}{50}$	$\frac{18}{24}$	$\frac{15}{16}$	$\frac{3}{3}$	$\frac{4}{24}$	$\frac{16}{60}$	$\frac{4}{12}$
$\frac{1}{2}$	$\frac{3}{5}$	$\frac{3}{4}$	$\frac{1}{1}$	$\frac{8}{10}$	$\frac{25}{100}$	$\frac{2}{5}$

2 What fraction am I?

a I am equivalent to one third. The sum of my numerator and denominator is 16.

b My numerator and denominator are both multiples of 4. I am equivalent to five sevenths. My denominator is sixteen more than my numerator.

c I am equivalent to $\frac{1}{2}$. The sum of my numerator and denominator is 15.

d I am equivalent to $\frac{2}{5}$. The product of my numerator and denominator is 40.

e I am equivalent to $\frac{80}{100}$. My denominator is a prime number.